

## AGRONOMY AND THE FUTURE

S.G. Coffey

CSIRO Division of Tropical Animal Production,  
PO Box 5545, Rockhampton Mail Centre, Qld 4702

*Summary.* It is suggested that two orientations - an evaluation perspective and a futuring perspective - will assist in a systematic assessment of future possibilities and enable the profession to move forward with greater certainty. The future for research, development, extension, education and training (RDEET) in agronomy in Australia is shaped by two major forces. Competitive pressures on our industries demand that RDEET investments return maximum benefits. Budget pressures, mainly in the public sector, mean we must achieve more with less resources. The situation is different from the past perhaps only in the time frame; results are demanded quicker. The challenge is to prepare ourselves for new possibilities, to anticipate change, and to assist in the creation of the future. The process of futuring will assist this.

### INTRODUCTION

John Kerin (3) is on record as stating that:

*The big questions for research policy in the (primary industry and energy) portfolio are **not** first and foremost: what research should be done, or how it should be paid for, **but** how will it be utilised. The point of research ... is not pushing back the frontiers of knowledge but pushing back the barriers to innovation (p. 103).*

If we accept the logic of Kerin's statement, then it is a reasonable observation to say that government policy objectives have been poorly comprehended by the research community, and by individual researchers. At the time of writing, a long awaited innovation strategy is about to be launched by the Federal government. Perhaps this may clarify understanding. I suspect, however, that it may add further to the confusion in a continually evolving policy framework.

I do not wish to contain my comments to a discussion of research, but there is an important point that such a discussion can illuminate. The agenda for research in the 1990's has been set by issues that are less traditional and more related to factors from outside research. This is seen clearly in the emphasis on utilisation of knowledge, rather than generation of knowledge, as the key driver of government policy. This has occurred at a time of severe pressures on budgets.

Writing about the future and agronomy is a daunting task. Research, development, extension, education and training (RDEET) are complex and diffuse activities. To discuss them as a whole has many pitfalls. An approach to this task is to look at the driving forces which will shape the future for RDEET, and then to suggest an orientation that will allow a realistic assessment of the future.

The distinctions I have drawn so far are particularly important for agronomy. I use the definitions that Michael Norman advanced at the First Australian Agronomy Conference at Lawes in 1980 (5).

*... the science of manipulating the crop/environment complex with the dual aim of improving agricultural productivity and gaining a deeper understanding of the process involved.*

### FACTORS SHAPING THE FUTURE

Two superordinate objectives dominate the scene in which agronomy is operating and will continue to operate:

1. *Competitive pressures.* The need for Australian industry to remain competitive internationally and domestically demands that RDEET investment be purposeful and productive.

2. *Budget pressures.* These are especially severe in Australia where there is a major reliance on RDEET provision by the public sector. Downsizing is a significant issue in the RDEET institutions.

I know that this is not an unfamiliar story to you. What is less debated is where these forces will take us.

## A SCENARIO FOR THE FUTURE

Before setting out to predict the future, we should bear in mind the cautionary observation of Michael Tracey (8):

*In attempting to foresee the future we all suffer from blindness, astigmatism and inadequate colour correction; even worse, we are not aware of the precise nature of our visual handicap, only that they must be there and are probably acute.*

Caution observed, I would like to suggest five major adjustments in the future. These are seen as end points and I recognise that we may not progress as far as these.

1. *Specialist research laboratories will become scarce.*

It is currently fashionable to take a multi-disciplinary and multi-functional team approach to R&D (1). Teams are made up of all necessary specialists including marketing, distributor and consumption. Team approaches may shorten lead times, but emphasise incrementalism. They may be responsive and cost effective, but this trend raises the question: *how will new science and technology be generated?*

Team approaches extend to such developments as Co-operative Research Centres (CRC's). Again, this can improve responsiveness and cost effectiveness. What remains uncertain is how the partner organisations will maintain their integrity in the new Co-operative arrangements. How will flexibility to pursue new areas of interest be maintained?

2. *Grants will be replaced by contracts with specific deliverables.*

This trend is self evident in agriculture, especially through the rural research corporations model. Targeted RDEET is becoming dominant and peer review losing favour as political influences increase. The trend towards contracts with deliverables is appearing in all relationships: *government - university, private sector - public sector, government - CSIRO, government department - government department.* This trend also reflects the general increase in *accountability* being sought and is not new (4).

3. *University research and training will become completely integrated with national and industry strategies.*

Pressure on funding will see an increasingly *vocational*, as opposed to *professional*, product from universities. By vocational, I mean new entrants to the workforce (at bachelor and higher levels) having the skills and competencies to do today's job, but requiring retraining to change. I contrast this with a more professional product, capable of learning the skills needed to adapt to a wide range of employment tasks and environments, and capable of re-educating themselves. R&D will become increasingly mission or target driven and the idea of basic research with no immediate application will cease.

4. *Government provision of RDEET will decline markedly.*

As governments respond to the dual goals of increasing private sector expenditure on R&D, and the need to curtail budgets, the shrinkage of public institutions supporting agriculture will continue. There will be political resistance to downsizing, but the trend appears inevitable. Many RDEET activities will be privatised. Two questions arise: how will the private sector make the transition? And, how will privatised bodies make the transition from guaranteed base funding to income generation?

## 5. *Notions of career and loyalty to organisations will change.*

An important perspective is the type of information or knowledge that exists in the RDEET system. Much of this knowledge is tacit knowledge (7) as opposed to codifiable knowledge. The distinction is that codifiable knowledge can be expressed and transferred in written or other recorded form (designs, formulae, specifications, etc). Tacit knowledge resides within personnel and may be embedded in organisational and social processes. Such information is difficult to transfer between organisations - and is part of the reason why activities like staff exchanges, consultancies and training and development activities are such important vehicles for information exchange.

But apart from collaboration, an understanding of the importance of tacit information has other potential. For example, the fastest way to transfer information and achieve technology adoption may be to transfer both the tacit and codifiable knowledge. This may be as simple as buying (recruiting) the people concerned.

From the viewpoint of the researcher, this also has major ramifications. It may no longer be sufficient to be employed. It may be more important to be employable - to contract in and out of organisations so long as the organisation can add to your skills and knowledge (your market base) and your values align. The *corporate citizen for life* is a person of the past.

I have deliberately restricted to five the issues discussed here, as I believe those are sufficient to point to the changes ahead.

What is the underlying message?

It is, simply, that RDEET in Australia is in a dynamic state. Funding sources, providers and the subject matter are all changing. The theme of these changes is increased productivity (of the RDEET itself, as well as the target sector of the economy), leveraging of resources, more influence from the constituency, and accountability. RDEET has an active future role, albeit within a much more constrained environment.

This calls for a much more holistic outlook than in the past - producing results with fewer resources. How far we progress down the pathways I have outlined above depends entirely upon how we respond to the opportunities of today. Our choices today, will shape tomorrow. Our responses to circumstances -- not the circumstances themselves -- determine our destiny.

## THE LESSONS OF HISTORY

What is new in this scenario? I would argue that very little is new, especially for agronomists.

McWilliam spoke of these trends, especially in contract R&D in 1979 (4). So did Norman in 1980 (5). Looking beyond our shores, Tracey (8) raised many of the same issues at the American Agronomy Society. The 1910 presidential address to the same society spoke of the need for collaboration. The 1937 address explores the debate between basic and applied research. The 1956 speech is *Team work in Agronomy*. (Clinton in 1913 predicted that the term agronomist would *soon become obsolete* as the field was so broad: a valuable reminder of the need to keep predictions in perspective!)

These few examples point to a very simple lesson. We have coped with change in the past, and will continue to do so in the future. The question is: how?

I would like to suggest that the pathway lies in two perspectives: **evaluation** and **futuring**.

## EVALUATION AND FUTURING

Patton (6) considers evaluation and futuring as the two door ways to the future. Evaluation involves a rigorous assessment of strengths and weaknesses, success and failure of RDEET. Futuring involves

looking at new directions in the light of new opportunities, major trends, changed needs: seeing where the world is going and how RDEET is going to be part of the new world. It can involve many methodologies such as Delphi studies, systems modelling, scenario building and simulation.

I will not discuss the methodologies for both, nor attempt a full analysis of the future and agronomy using this framework. What I would like to suggest is that there are some useful questions we can answer. These are outlined in Table 1 and are modified from Hamal and Prahalad (2). In Table 1, I give a thumbnail description of three scenarios that could be built using such questions.

### *The Past*

Our customers were government primarily (i.e. they paid for the RDEET). There was little real communication with government as agriculture enjoyed a preferred and privileged position in the economy. Communication was confined to senior institutional managers who argued with Ministers and Treasury for an annual allocation. Accountability was to peers. There was little real competition for RDEET and budgets generally grew from the late 40's to early 80's. Our competitive advantage was our isolation from the market and the general lack of public scrutiny. We were generally unique because of our level of education. Generally, we produced knowledge applied in practice (after all that is how we define agronomy) but this was not often evaluated.

Table 1. A possible framework for evaluating and futuring.

<b>5 to 10 years in the past</b>	<b>Today</b>	<b>5 to 10 years in the future</b>
Which customers did you serve <i>in the past?</i>	Which customers are you serving <i>today?</i>	Which customers will you be serving in the <i>future?</i>
Through what channels did you reach your customer <i>in the past?</i>	Through which channels do you reach customers <i>today?</i>	Through what channels will you reach customers <i>in the future?</i>
Who were your competitors <i>in the past?</i>	Who are your competitors <i>today?</i>	Who will be your competitors <i>in the future?</i>
What was the basis of your competitive advantage <i>in the past?</i>	What is the basis of your competitive advantage <i>today?</i>	What will be the basis for your competitive advantage <i>in the future?</i>
What skills or capabilities made you unique <i>in the past?</i>	What skills or capabilities make you unique <i>today?</i>	What skills or capabilities will make you unique <i>in the future?</i>
In what end product markets did you participate <i>in the past?</i>	In what end product markets do you participate <i>today?</i>	In what end product markets will you participate <i>in the future?</i>

### *The Present*

Our customers include private companies and industries through R&D corporations. But government still provides 80-90% of the funds, so is the major customer. Communication is more important as agriculture has lost its privileged place. We are more aware of the general public as a source of influence. We now compete with the manufacturing and service sectors for resources, and there is greater emphasis on

delivery of benefits to industry (on time and within budget). Our competitive advantage lies in our knowledge of the systems and environments in which we work. Increasingly, we have marketed ourselves on the basis of our unique geography and ecology. We cannot borrow someone else's solution. Our skills and capabilities are stretched by the need to appreciate all aspects of the marketing chain. We are required to work under ambiguity, to be flexible, while at the same time deploying our expert knowledge. We produce knowledge and information of direct use by industry, and are often called upon to impart the skills necessary for companies to use our product.

### *The Future*

A wider range of customers will pay for RDEET. These customers will need to be identified and their individual needs catered for. The largely institutional-based communication of the past will be just that - a thing of the past. We will work in a multitude of different organisational settings, and will market ourselves unashamedly. We will compete with other RDEET providers in agronomy, as well as other sectors of the economy. To compete successfully we will be closely aligned with customer expectations, but will also help shape those expectations. They will require new skills and capabilities - those which will enable us to shape an environment which values creativity at the same time as rewarding short-term success. Our end product market will be whatever the customer will pay for.

Of course, this approach needs to be taken at many different levels within any given field. For example, each component of RDEET should be the subject of separate analysis. It is also a process useful for individual reflection on the future. And, equally important, we will each have our own contribution to make, so dialogue becomes an important part of the process.

Futuring has five primary elements (6):

- It is not so much the future as it is about the present. We need to look at what might be, and work back to the present.
- It is not about predictions. Rather it is about preparing ourselves for alternative possibilities.
- It is about constructing scenarios of possibilities, looking at their implications, monitoring trends, and preparing for unknown possibilities so that when the future unfolds, we are ready for whatever comes.
- The only things that you can bet on for sure is that the future will be different from the present.
- The worst possible database that you can use to plan the future are straight line projections of the past.

### THE CHALLENGE

The challenge for us in agronomy then is to prepare ourselves for new possibilities, new worlds, new scenarios, through trend analysis, through scenario building, through visioning, through systems modelling, through simulators, through environmental scanning, through a variety of scientific approaches to looking at, and building the future. This is best achieved when it is firmly grounded on an understanding of the past and present, that is, when we have a sound evaluation of achievements, strengths and weaknesses; and when we are aware of trends in the operating environment. If we seek to defend the past then we must be certain that it is better than the future.

### CONCLUSIONS

Let me close by saying that the future is a very personal thing. Sociologists describe a phenomenon called *fatalism*: the world is just the way it is, it unfolds the way it is, there's nothing you can do about it (6).

The thing that I think we share in common is that *we believe that what we do makes a difference*. That has been the hallmark of Australian agronomy. The pace of change, however, has put a strain on the system, and I believe that a more rigorous application of futuring is a useful tool to help cope with change. This requires individuals to reflect on their roles as professional agronomists. We must seek to use the tools and conceptual frameworks of evaluation and futuring to help us to do those things that we are committed to: making a difference, grasping the future, controlling the future and helping it unfold in ways that make a difference in people's lives.

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